93. *Comments.* The majority of commenters addressing the issue support our proposal to permit partitioning and disaggregation by WCS licensees and propose specific rules.[236] For example, GTE agrees that partitioning and disaggregation should be permitted as long as the technical rules preventing harmful interference are met.[237] Similarly, GTA and ALLTEL believe that disaggregation should be permitted, but only in 5 MHz increments.[238] Finally, BellSouth agrees with the Commission's proposals to the extent that the spectrum is exclusively allocated for the "specialized services" that it recommends, such as wireless cable and wireless data, including Internet access and e-mail (both for commercial use and for schools, libraries and hospitals).[239]

94. Some commenters believe that liberal partitioning and disaggregation rules are not effective substitutes for direct participation in an auction by small businesses, rural telcos, and other designated entities.[240] NextWave argues that if large service areas are employed, disaggregation will not be a reliable means of promoting economic opportunity and competition or avoiding excessive concentration of licenses.[241] Similarly, BellSouth and NextWave note that the need for disaggregation and partitioning may be avoided altogether through the use of BTAs as WCS service areas, the aggregation of which they believe to be more efficient than disaggregation and partitioning of larger service areas.[242] Further, RTG believes that, in order for our partitioning and disaggregation policies to ensure the participation of rural telcos, these entities should be afforded a right of first refusal to partition and aggregate spectrum in areas reasonably related to their wireline service areas.[243]

95. Those commenters that addressed our proposal to permit WCS licensees to lease or franchise portions of their spectrum are largely supportive. For example, two commenters suggest that there should be no minimum amount of spectrum or any particular geographic

---

[236] *See, e.g.*, PCIA Comments at 19; Vanguard Comments at 8; SBC Comments at 7; UTC Comments at 7; ADC Comments at 18; AT&T Comments at 4; CTIA Comments at 10-11; AirTouch Comments at 9 and n. 22; AWWA Comments at 4; AMTA Reply Comments at 4.

[237] GTE Comments at 8.

[238] GTA Comments at 2; ALLTEL Comments at 3-4.

[239] BellSouth Comments at 13-14.

[240] RTG Comments at 12-14; CIRI Comments at 8; TTS Reply Comments at 3.

[241] NextWave Reply Comments at 4.

[242] BellSouth Comments at 7-8; NextWave Reply Comments at 6.

[243] RTG Comments at 13.

area limitations for leasing or franchising.[244] BellSouth and SNET Mobility believe, however, that the Commission's proposals for the leasing or franchising of spectrum should be subject to license control requirements and, if CMRS is provided, that the attribution to lessees and franchisees of such interests should be applied for purposes of the CMRS spectrum cap.[245] TDS advocates the articulation of guidelines defining the "ultimate responsibility" of the licensee in the context of proposed rule Section 27.16. TDS regards such guidelines as essential in providing a workable level of certainty for participants in leasing arrangements. Finally, TDS requests the application of such a franchising policy to other CMRS services.[246]

96. *Decision.* Consistent with the weight of the comments and with the Commission's recent decision to adopt the approach proposed in WT Docket No. 96-148 for broadband PCS,[247] we adopt our proposals for geographic partitioning and spectrum disaggregation. We will permit WCS licensees to partition their service areas into smaller geographic service areas and to disaggregate their spectrum into smaller blocks. We also conclude that the specific rules pertaining to partitioning and disaggregation in WT Docket No. 96-148 shall apply to WCS licensees. In addition, for the purposes of partitioning and disaggregation, we will require that WCS systems be designed so as not to exceed a signal level of 47 dBuV/m at the licensee's service area boundary, unless the affected adjacent service area licensees have agreed to a different signal level.

97. In WT Docket No. 96-148, we decided to permit geographic partitioning by broadband PCS licensees along any service area defined by the partitioner and partitionee.[248] In addition, we decided to permit spectrum disaggregation by broadband PCS licensees without restriction on the amount of spectrum to be disaggregated.[249] We concluded that allowing parties to decide without restriction the amount of spectrum to be disaggregated will encourage more efficient use of the spectrum and permit the deployment of a broader mix of service offerings, both of which will lead to a more competitive wireless marketplace.[250] We believe that this reasoning applies with equal force to WCS. Therefore, subject to the

---

[244] Bellcore Comments at 3-4; BellSouth Comments at 13-14.

[245] BellSouth Comments at 13-14; SNET Mobility Reply Comments at 4.

[246] TDS Reply Comments at 3-5 (also setting forth a set of guidelines for this purpose).

[247] *See Partitioning and Disaggregation R&O, supra.*

[248] *Id.* at ¶¶ 23-24.

[249] *Id.* at ¶¶ 49-50.

[250] *Id.* at ¶ 49.

provisions discussed below with respect to licensees who take advantage of bidding credits, once an initial WCS license is granted, licensees will be free to partition their service areas and disaggregate their spectrum. Finally, consistent with PCS and other CMRS services, WCS licensees will be allowed to use management and operational arrangements to permit others to use portions of their spectrum and geographic service areas. We wish to emphasize that the WCS licensee must retain ultimate control over and responsibility for all operations under such arrangements.

98. We conclude that any licensee will be permitted to partition its service area as long as it submits sufficient information to the Commission to maintain our licensing records. Partitioning applicants will be required to submit, as separate attachments to the partial assignment application, a description of the partitioned service area and a calculation of the population of the partitioned service area and licensed market. The partitioned service area must be defined by coordinate points at every 3 degrees along the partitioned service area agreed to by both parties, unless either (1) an FCC-recognized service area is utilized (*i.e.*, Major Trading Area, Basic Trading Area, Metropolitan Service Area, Rural Service or Economic Area) or (2) county lines are followed. These geographical coordinates must be specified in degrees, minutes and seconds to the nearest second of latitude and longitude, and must be based upon the 1927 North American Datum (NAD27). Applicants also may supply geographical coordinates based on 1983 North American Datum (NAD83) in addition to those required based on NAD27. This coordinate data should be supplied as an attachment to the partial assignment application, and maps need not be supplied. In cases where an FCC-recognized service area or county lines are being utilized, applicants need only list the specific area(s) (through use of FCC designations) or counties that make up the newly partitioned area.[251]

99. Similarly, where WCS licensees seek to disaggregate their WCS spectrum, we will not require the disaggregating party to retain a minimum amount of spectrum. We will allow disaggregating parties to negotiate channelization plans among themselves as part of their disaggregation agreements, and we will continue to require that such plans provide the necessary out-of-band emission protections to third party licensees as required by our rules. We are not adopting a limit on the maximum amount of spectrum that licensees may disaggregate. We find no evidence at this time that a maximum limitation for disaggregation is necessary. WCS licensees shall be permitted to disaggregate spectrum without limitation on the overall size of the disaggregation as long as such disaggregation is otherwise consistent with our rules.

[251] For example, if a licensee desires to partition its license only for the service area needed by a rural telco, it will simply provide coordinate data points at each 3 second data point extending from the center of the service area (*i.e.*, at the 3 degree, 6 degree, 9 degree, 12 degree, etc. azimuth points with respect to true north).

100. We decline to adopt RTG's proposal to provide rural telcos with a right of first refusal. Section 254 of the Telecommunications Act of 1996[252] states that, in seeking to promote its goal of universal service, the Commission should ensure that consumers from all parts of the Nation, including rural areas, have access to telecommunications and information services that is comparable to service in other, more urban areas and at rates that are comparable to the rates available in urban areas. Granting rural telcos a right of first refusal would be at odds with our goals of ensuring that the largest number of entities participate in the WCS marketplace and eliminating barriers to entry for small businesses. As we concluded in WT Docket No. 96-148, we also believe that a right of first refusal would be difficult to administer and could discourage partitioning.[253] For example, an area proposed for partitioning to a non-rural telco may intersect with an area for which a rural telco has a right of first refusal. A further problem would be uncertainty as to whether the rural telco's right of first refusal would continue after the auction winner partitioned the license area to another party. Additionally, a partitioning agreement may be part of a larger assignment transaction. If a rural telco were able to exercise a right of first refusal with respect to a partitioned area, it may not be possible to separate out the partitioning agreement to stand on its own and the entire assignment transaction could not be consummated.[254]

101. If a WCS licensee that received a bidding credit partitions a portion of its license to an entity that would not meet the eligibility standards for a similar bidding credit, we will require that the licensee reimburse the government for the amount of the bidding credit calculated on a proportional basis based upon the ratio of population of the partitioned area to the overall population of the licensed area.[255] If a licensee that received a bidding credit partitions to an entity that would qualify for a lesser bidding credit, we will require that the licensee reimburse the government for the difference between the amount of the bidding credit obtained by the licensee and the bidding credit for which the partitionee is eligible, calculated

---

[252] Pub. L. No. 104-104, § 101, 110 Stat. 56 (1996).

[253] *Partitioning and Disaggregation R&O, supra,* at ¶¶ 17-18.

[254] *Id.* at ¶ 18.

[255] *See* 47 C.F.R. §§ 1.2110(f) and 24.717(c)(1). For example, if a WCS licensee bid $1,000,000 at auction and received a 25 percent bidding credit ($250,000), it would have been required to pay $750,000 in principal to the U.S. Treasury. If that licensee seeks to partition a portion of its license area which represents 25 percent of the population of its entire license area (calculated at the time of partitioning) to an entity that would not qualify for a bidding credit, then 25 percent of the amount of the bidding credit ($250,000 X .25 or $62,500) must be paid by the licensee to the U.S. Treasury.

on a proportional basis based upon the ratio of population of the partitioned area.[256] Similar provisions shall apply where a WCS licensee that receives a bidding credit seeks to disaggregate a portion of its spectrum to an entity that would not have qualified for such a bidding credit. All such unjust enrichment payments will be calculated based upon the ratio of the amount of spectrum disaggregated to the amount of spectrum retained by the original licensee. With respect to disaggregation from one licensee that qualified for a bidding credit to another licensee that would also qualify for a bidding credit, we will adopt an approach similar to that adopted for partitioning.

102. Finally, to allow WCS licensees flexibility to design the types of agreements they desire, we will follow our decision in WT Docket No. 96-148 to permit combined partitioning and disaggregation. For example, a party may obtain a license for a single county with only 5 MHz of WCS block A spectrum. By allowing such combined partitioning and disaggregation, we believe that the goals of providing competitive service offerings, encouraging new market entrants, and ensuring quality service to the public will be advanced. We further conclude that in the event that there is a conflict in the application of the partitioning and disaggregation rules, the partitioning rules should prevail. For the purpose of applying our unjust enrichment provisions relating to bidding credits, when a combined partitioning and disaggregation is proposed, we will use a combination of both population of the partitioned area and amount of spectrum disaggregated to make these *pro rata* calculations. For example, if a WCS licensee that availed itself of a bidding credit and a non-qualifying partitionee/disaggregatee were to agree on a 20 percent disaggregation of spectrum over 30 percent of the population of the licensed service area, an unjust enrichment payment of 6 percent (.20 x .30) of the bidding credit would be required.

103. We also note that these geographic partitioning and spectrum disaggregation rules, while not a substitute for licensing directly from the Commission, nevertheless will help to eliminate market entry barriers, consistent with Section 257 of the Communications Act, by providing smaller, less capital-intensive areas and spectrum blocks which are more accessible by small business entities.[257]

---

[256] *See* 47 C.F.R. §§ 1.2110(f) and 24.717(c)(2). For example, if a WCS licensee bid $1,000,000 at auction and received a 35 percent bidding credit ($350,000), it would have been required to pay $650,000 in principal to the U.S. Treasury. If that licensee seeks to partition a portion of its license area which represents 25 percent of the population of its entire license area (calculated at the time of partitioning) to an entity that would have qualified for only 25 percent bidding credit ($100,000), then 25 percent of the difference between the bidding credits ($350,000 - $250,000 X .25 or $25,000) must be paid by the licensee to the U.S. Treasury.

[257] *See* 47 U.S.C. § 257.

4. License Term

104. *Background.* In the *NPRM*, we proposed to establish a license term of 10 years for services in the 2305-2320 and 2345-2360 MHz bands, with a renewal expectancy similar to that of PCS and cellular licensees. We also proposed that in the event that a WCS license is partitioned or disaggregated, any partitionee/disaggregatee would be authorized to hold its license for the remainder of the partitioner's/disaggregator's original ten-year license term.

105. *Comments.* Few commenters addressed our proposals regarding the appropriate license term for WCS. SBC and GTE support our proposal that the WCS license term be the same as for current CMRS licensees, and GTE further recommends that if a WCS licensee disaggregates or partitions part of its original license, the party receiving the disaggregated or partitioned portion should have a reasonable expectation of retaining the use of the spectrum for the full term of the WCS licensee's original term.[258]

106. *Decision.* We will adopt our proposals regarding the term of WCS licenses and the renewal expectancy for both original WCS licensees and potential WCS partitionees/disaggregatees. The WCS license term will be 10 years, with a renewal expectancy similar to that afforded PCS and cellular licensees. We believe that this relatively long license term, combined with a renewal expectancy, will help to provide a stable regulatory environment that will be attractive to investors and, thereby, encourage development of this new frequency band. In the event that a WCS license is partitioned or disaggregated, any partitionee/disaggregatee will be authorized to hold its license for the remainder of the partitioner's/disaggregator's original ten-year license term, and the partitionee/disaggregatee will be required to submit the showings required at the five-year mark and with its renewal application. We believe that this approach, which is similar to the partitioning provisions we recently adopted for the MDS[259] and for current broadband PCS licensees,[260] is appropriate because a licensee, through partitioning, should not be able to confer greater rights than it was awarded under the terms of its license grant.

107. We will require that a WCS licensee's renewal application include at a minimum the following showing to claim a renewal expectancy: (1) a description of current service in terms of geographic coverage and population served or links installed; (2) an explanation of

---

[258] SBC Comments at 7; GTE Comments at 9.

[259] *See Amendment of Parts 21 and 74 of the Commission's Rules With Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service*, MM Docket No. 94-131, *Report and Order*, 10 FCC Rcd 9589, 9614 (1995).

[260] *See Partitioning and Disaggregation R&O* at ¶¶ 76-77.

the licensee's record of expansion, including a timetable for the construction of new base sites or links to meet changes in demand for service; (3) a description of the licensee's investments in its system; and (4) copies of any FCC orders finding the licensee to have violated the Communications Act or any FCC rule or policy, and a list of any pending proceedings that relate to any matter described by the requirements for the renewal expectancy.[261]

5. Performance Requirements

108. *Background.* In the *NPRM*, we questioned whether, and if so, what type of construction (or "build-out") requirements should be made applicable to WCS licensees. We recognized that in implementing auction procedures, the Commission is required under Section 309(j) of the Communications Act to include "safeguards to protect the public interest in the use of the spectrum" and performance requirements "to ensure prompt delivery of service to rural areas, to prevent stockpiling or warehousing of spectrum by licensees or permittees, and to promote investment in and rapid deployment of new technologies and services."[262] We stated generally that although build-out requirements may help to achieve these goals, we were somewhat uncertain as to whether applying such requirements to the licenses of the WCS spectrum would be the best way to address Congress's concerns.

109. *Comments.* We received mixed comments on whether build-out requirements should be imposed on WCS licensees. Some commenters feel that this determination should depend upon whether WCS spectrum is used to provide services that also are provided by licensees in other bands who are subject to build-out requirements. If so, they believe that the same regulatory treatment should apply. Several commenters note this regulatory parity issue and advocate applying build-out requirements for WCS to whatever extent they apply for competing services (*e.g.*, PCS or wireless cable) in other bands.[263] Other commenters advocate applying them for reasons of regulatory parity with respect particularly to CMRS,[264] or, more particularly, to PCS.[265] Some commenters argue that build-out requirements should be established simply to advance the traditional goals of performance requirements -- to

---

[261] *Cf.* 47 C.F.R. § 22.940(a)(2)(i)-(iv). We note that, because of the difference in the nature of the respective services, we are not requiring WCS licensees to demonstrate an ability to serve roamers, as we do cellular radio licensees.

[262] 47 U.S.C. § 309(j)(4)(B).

[263] AirTouch Comments at 10-11; BANM Comments at 4, 11, and 13; CTIA Comments at 11-12; Omnipoint Reply Comments at 4; Ameritech Reply Comments at 2-3.

[264] PCIA Comments at 3 and 10; Omnipoint Comments at 10.

[265] Sprint PCS/Sprint Comments at 3 and 9; PrimeCo Comments at 11; Vanguard Comments at 8.

ensure rapid deployment of services and to prevent spectrum warehousing,[266] to ensure that carriers provide progressively greater and improved service,[267] to assure provision of service to rural areas,[268] and to prevent large service providers and incumbent LECs from impeding competition by buying out all competitors.[269] Two cellular companies believe that reasonable build-out requirements, such as those used for PCS, would not be a significant burden on WCS licensees.[270] Omnipoint proposed that, in lieu of specific build-out requirements, licensees be required to make a showing of substantial service at a five-year benchmark.[271]

110. In contrast, several commenters believe that performance requirements might not be necessary for WCS or that they may even be potentially harmful.[272] PPF asserts that the use of competitive bidding and the broad range of services that may be offered on WCS spectrum ensure that the WCS spectrum will end up in the hands of parties that value it most highly and have the most incentive to develop it.[273] DigiVox contends that build-out requirements would discourage use of the spectrum by low-tier services whose physical infrastructure deployment to cover a geographic area will require relatively long periods of time to build out.[274] PCIA urges the Commission not to adopt performance requirements if the WCS spectrum is used to provide a high-speed data service.[275] In this regard, AT&T contends that, if the Commission finds that build-out requirements are unnecessary for WCS licensees, it should eliminate build-out requirements for all CMRS licensees in the interests of regulatory parity.[276] BellSouth, though generally supportive of build-out requirements,

---

[266] Sprint PCS/Sprint Comments at 3 and 9; PrimeCo Comments at 11; Vanguard Comments at 8.

[267] BANM Comments at 4, 11, and 13.

[268] RTG Comments at 15; AirTouch Comments at 10-11.

[269] Omnipoint Comments at 10.

[270] Vanguard Comments at 8; Florida Cellular Comments at 2.

[271] Omnipoint Comments at 10.

[272] *See, e.g.*, PPF Comments at 5; AT&T Comments at 9; DigiVox Reply Comments at 7-8.

[273] PPF Comments at 5.

[274] DigiVox Comments at 7.

[275] PCIA Comments at 3 and 10.

[276] AT&T Comments at 9.

similarly believes that if they are not applied to WCS licensees they also should be eliminated in all competing services.[277]

111. *Decision.* We have concluded that, considering the unique circumstances in which WCS licenses are being awarded and the strict technical requirements necessary to prevent interference, we will adopt very flexible build-out requirements for WCS. Specifically, we will require licensees to provide "substantial service" to their service area within 10 years. Although WCS licensees will have incentives to construct facilities to meet the service demands in their licensed service area, we believe that minimum construction requirements can promote efficient use of the spectrum, encourage the provision of service to rural, remote and insular areas and prevent the warehousing of spectrum.

112. The build-out requirement that we adopt today is the most liberal construction requirement adopted by the Commission to date. We believe that this liberal build-out requirement is appropriate in the case of WCS for a number of reasons. First, we are providing WCS licensees with the flexibility to offer a range of services using the WCS spectrum. Given the broad range of new and innovative services that the comments lead us to believe might be provided over WCS spectrum, imposing strict construction requirements that would apply over the license term would be neither practical nor desirable as a means of meeting Section 309(j)'s objectives regarding warehousing and rapid deployment. Without knowing the specific type of service or services to be provided, it would be difficult to devise specific construction benchmarks. Further, given the undeveloped nature of equipment for use in this band and the technical requirements we are adopting to prevent interference, we are concerned that strict construction requirements might have the effect of discouraging participation in the provision of services over the WCS spectrum. It may be that a potential licensee could efficiently conduct certain operations on WCS spectrum, but must await further technological developments to do so affordably. Adopting strict construction requirements here could effectively preclude efficient uses of the spectrum. Particularly in light of the technological uncertainties associated with use of WCS spectrum to provide certain services consistent with the interference levels we adopt today, we believe that stringent build-out requirements are not warranted.

113. At the ten year period, we will require all licensees to submit an acceptable showing to the Commission demonstrating that they are providing substantial service. Licensees failing to demonstrate that they are providing substantial service will be subject to forfeiture of their licenses. We note that in the past we have defined substantial service as "service which is sound, favorable, and substantially above a level of mediocre service which

[277] BellSouth Comments at 12-13.

just might minimally warrant renewal."[278] For WCS, however, we believe that further elaboration on this standard in the form of examples of what might constitute substantial service is useful. Thus, for a WCS licensee that chooses to offer fixed, point-to-point services, the construction of four permanent links per one million people in its licensed service area at the ten-year renewal mark would constitute substantial service. In the alternative, for a WCS licensee that chooses to offer mobile services, a demonstration of coverage to 20 percent of the population of its licensed service area at the ten-year mark would constitute substantial service. In addition, the Commission may consider such factors as whether the licensee is offering a specialized or technologically sophisticated service that does not require a high level of coverage to be of benefit to customers,[279] and whether the licensee's operations serve niche markets or focus on serving populations outside of areas served by other licensees.[280] These safe-harbor examples are intended to provide WCS licensees a degree of certainty as to how to comply with the substantial service requirement by the end of the initial license term. This requirement can be met in other ways, and we will review licensees' showing on a case-by-case basis.

114. We believe that these build-out provisions fulfill our obligations under Section 309(j)(4)(B). We also believe that the auction and service rules which we are adopting for WCS, together with our overall competition and universal service policies, constitute effective safeguards and performance requirements for WCS licensing. Because a license will be assigned in the first instance through competitive bidding, it will be assigned efficiently to a firm that has shown by its willingness to pay market value its willingness to put the license to its best use. We also believe that service to rural areas will be promoted by our proposal to allow partitioning and disaggregation of WCS spectrum.[281]

---

[278] *See, e.g.*, 47 C.F.R. § 22.940(a)(1)(i).

[279] We have taken this approach in the past with respect to other services. *See Amendment of Parts 2 and 90 of the Commission's Rules to Provide for the Use of 200 Channels Outside the Designated Filing Areas in the 896-901 MHz and the 935-940 MHz Bands Allotted to the Specialized Mobile Radio Pool -- Implementation of Section 309(j) of the Communications Act -- Competitive Bidding and Implementation of Sections 3(n) and 322 of the Communications Act*, GN Docket No. 93-252, *Second Report and Order and Second Further Notice of Proposed Rule Making*, FCC 95-159, 10 FCC Rcd 6884 (1995) at ¶ 4.

[280] *See Amendment of Parts 2 and 90 of the Commission's Rules to Provide for the Use of 200 Channels Outside the Designated Filing Areas in the 896-901 MHz and the 935-940 MHz Bands Allotted to the Specialized Mobile Radio Pool -- Implementation of Sections 3(n) and 322 of the Communications Act*, GN Docket No. 93-252, *Third Order on Reconsideration*, FCC 95-429, 11 FCC Rcd 1170 (rel. October 20, 1995) at ¶ 2.

[281] In addition, the broad universal service policies of the Telecommunications Act of 1996 will contribute substantially to addressing this objective as well.

115. Finally, we note that we reserve the right to review our liberal construction requirements in the future if we receive complaints related to Section 309(j)(4)(B), or if our own monitoring initiatives or investigations indicate that a reassessment is warranted. We also reserve the right to impose additional, more stringent construction requirements on WCS licenses in the future in the event of actual anticompetitive or rural service problems and if more stringent construction requirements can effectively ameliorate those problems.

6. Regulatory Status

116. *Background.* As we noted in the *NPRM*, the Communications Act applies differing requirements based on the type of service and the regulatory status of licensees. Given our proposal that a WCS operator be allowed to provide a variety or combination of fixed, mobile, satellite DARS, and radiolocation services, we proposed to rely on the applicant to identify the type of WCS service or services it will provide, with sufficient detail to enable the Commission to determine the applicant's regulatory status.

117. *Comments.* A number of commenters addressed the issue of regulatory parity between current CMRS licensees and WCS licensees in discussing whether the CMRS spectrum cap should apply to WCS. This issue has been addressed above.[282] With regard to the regulatory status of WCS licensees in general, however, only GTE submitted comments concerning our proposals. GTE does not oppose the Commission's proposal to establish a presumption that WCS providers will likely offer CMRS service.[283] GTE does urge the Commission, however, to establish procedures to enable interested parties to rebut this presumption and show that the service being provided is deserving of a different regulatory treatment.[284]

118. *Decision.* We received a significant number of comments challenging our presumption in the *NPRM* that CMRS would be the most likely use of the WCS spectrum and suggesting that the spectrum would more likely be used to offer various other types of services.[285] We therefore conclude that we will rely on each WCS applicant to identify in its long-form application the type of WCS service or services it will provide, with no presumption favoring status as a CMRS provider. Although we will not presume at the outset that a WCS applicant will provide CMRS service, we continue to believe, as we stated in the

[282] *See* Section III.D.2, *supra.*

[283] GTE Comments at 9.

[284] *Id.*

[285] *See* Section III.A.2, *supra.*

NPRM, that this approach will allow us to carry out our responsibilities while imposing the least regulatory burden on the licensee. We also delegate to the Wireless Telecommunications Bureau and to the International Bureau authority to develop forms appropriate to collect this data, and to monitor changes in licensee status. The predominant uses of WCS spectrum mentioned by commenters involved personal communications such as broadband voice and data transmission, including wireless local loop and wireless Internet access. If WCS spectrum is used for satellite DARS services, those services will be governed by the satellite DARS regulations currently under development in IB Docket No. 95-91.

119. Our decision to permit WCS licensees to provide a variety or combination of services requires that we adopt a licensing framework that authorizes WCS licensees to provide non-common carrier services as well as common carrier services. We have recently increased the flexibility of licensees in other wireless services to provide both common carrier and non-common carrier services. In adopting a new application form for MDS, for example, we provided applicants with the option on the new form to indicate their choice for common carrier or non-common carrier regulatory status.[286] For satellite services, we have decided to provide all U.S.-licensed fixed satellite service systems with a choice between offering common carrier and non-common carrier services and also the opportunity to elect their regulatory classification in their applications.[287] In another proceeding, we have adopted streamlined rules in Part 25 for satellite services to use a simplified procedure to change licenses from non-common carrier status to common carrier status.[288] Finally, when we implemented DBS systems under interim rules we adopted a policy to permit the dual provision of common and non-common carrier services,[289] which continues under the

---

[286] *Amendment of Parts 21 and 74 of the Commission's Rules with Regard to Filing Procedures in the Multipoint Distribution Service and in the Instructional Television Fixed Service*, MM Docket No. 94-131, and *Implementation of Section 309(j) of the Communications Act -- Competitive Bidding*, PP Docket No. 93-253, *Report and Order*, 10 FCC Rcd 9589, 9619 (¶ 59), Appendix D (1995) (*"MDS and ITFS Competitive Bidding Report and Order"*).

[287] *Amendment to the Commission's Regulatory Policies Governing Domestic Fixed Satellites and Separate International Systems*, IB Docket No. 95-41, *Notice of Proposed Rulemaking*, 10 FCC Rcd 7789, 7795-7796 (¶¶ 30-33) (1995); *Report and Order*, 11 FCC Rcd 2429, 2436 (¶¶ 45-50)(1996) (*"DISCO I Report and Order"*).

[288] *Streamlining the Commission's Rules and Regulations for Satellite Application and Licensing Procedures*, IB Docket No. 95-117, *Notice of Proposed Rulemaking*, 10 FCC Rcd 10624 (1995); *Report and Order*, FCC 96-425, 62 FR 5924 (rel. December 16, 1996) (*"Satellite Rules Report and Order"*).

[289] *Inquiry into the Development of Regulatory Policy in Regard to Direct Broadcast Satellites for the Period Following the 1983 Regional Administrative Radio Conference*, GN Docket No. 80-603, *Notice of Proposed Policy Statement and Rulemaking*, 86 FCC 2d 719, 750 (1981); *Report and Order*, 90 FCC 2d 676, 706 (1982) (*"Interim DBS Report and Order"*).

permanent rules.[290] The flexible licensing framework we adopt for WCS is consistent with the treatment accorded these services.

120. We therefore will allow the service offering selected by a WCS licensee to determine its regulatory status. If a service offering falls within the statutory definition of common carrier,[291] the licensee will be subject to Title II and the licensing requirements of Title III of the Communications Act and our Rules. Otherwise, services provided on a non-common carriage basis will be subject to Title III and certain other statutory and regulatory requirements, depending on the specific characteristics of the service. The Telecommunications Act of 1996 provides that a telecommunications carrier will "be treated as a common carrier under this Act only to the extent that it is engaged in providing telecommunications services."[292] A telecommunications service is the "offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used."[293] Telecommunications means "the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received."[294] We adopted these definitions in new Part 51, which provides the rules governing interconnection of such carriers.[295] Thus, to the extent a WCS licensee is providing a service that fits within these definitions, that licensee will be subject to Title II and governed by the common carrier requirements pertinent to its services. Those requirements are set out in Part 1 and other parts of our Rules. In addition, the regulatory treatment of WCS licensees who choose to offer fixed or mobile telecommunications services will be addressed by the Commission in WT Docket No. 96-6.[296]

---

[290] *Revision of Rules and Policies for the Direct Broadcast Satellite Service*, IB Docket No. 95-168, PP Docket No. 93-253, *Notice of Proposed Rulemaking*, 11 FCC Rcd 1297 (1995); *Report and Order*, 11 FCC Rcd 9712 (1995).

[291] *See* 47 U.S.C. § 153.

[292] 47 U.S.C. § 153(44).

[293] 47 U.S.C. § 153(46).

[294] 47 U.S.C. § 153(43).

[295] *Implementation of the Local Competition Provisions in the Telecommunications Act of 1996 -- CC Docket No. 96-98, Interconnection between Local Exchange Carriers and Commercial Mobile Radio Service Providers*, CC Docket No. 95-185, *First Report and Order*, 11 FCC Rcd 15499 (rel. August 8, 1996) at ¶ 992 and Appendix B, adopting new Rule 51.5. The U.S. Court of Appeals for the Eighth Circuit has stayed the pricing rules in the Order, pending review on the merits. *See Iowa Utilities Board v. FCC*, No. 96-3321 (8th Cir., Oct. 15, 1996).

[296] *See Amendment of the Commission's Rules to Permit Flexible Service Offerings in the Commercial Mobile Radio Services*, WT Docket No. 96-6, *First Report and Order*, 11 FCC Rcd 8965 (rel. August 1, 1996).

121. Apart from this designation of regulatory status, we will not require WCS applicants to describe the services they seek to provide. It is sufficient that an applicant indicate its choice for regulatory status in a streamlined application process. In providing guidance on this issue to MDS applicants, for example, we pointed out that an election to provide service on a common carrier basis requires that the elements of common carriage be present; otherwise, the applicant must choose non-common carrier status.[297] Of course, if an applicant is unsure of the nature of its services and their classification as common carrier services, it may submit a petition with its application or at any time request clarification and include service descriptions for that purpose.[298]

122. We also decline to require an applicant to choose between either common carrier or non-common carrier status in providing services in instances where it proposes to provide services that include elements of both common carrier and non-common carrier services. Instead, we will permit both common carrier and non-common carrier services in a single license. An applicant may request both common carrier and non-common carrier status in the same application, which will result in the issuance of both authorizations in a single license. The licensee will be able to provide all WCS services anywhere within its licensed area at any time. This approach achieves efficiencies in the licensing and administrative process. We note that we have allowed certain mobile services in Part 24 and Part 90 to be authorized in a single license on both a common carrier and private carrier basis in order to provide services in both categories of service.[299]

7. Out-of-Band Emission Limits

123. *Background.* In the *NPRM*, we stated that, because WCS will operate in the 2305-2320 and 2345-2360 MHz bands, interference protection is required for the following adjacent operations: (1) satellite DARS at 2320-2345 MHz, (2) Government Deep Space

[297] *MDS Report and Order*, 2 FCC Rcd at 4252 (¶¶ 11-12).

[298] *Cf.* In authorizing the dual provision of common and non-common carrier service under a DBS license, we recognized that there may be classification questions to address in order to correctly impose the applicable common carrier or other statutory requirements on the applicant. We decided to resolve such questions in the context of each individual application and to rely on applicants' showing of the particular features of their proposals on a case by case basis. *Interim DBS Report and Order*, 90 FCC 2d at 709 (¶¶ 85-86, n. 79) (1982).

[299] *Implementation of Sections 3(n) and 332 of the Communications Act: Regulatory Treatment of Mobile Services*, GN Docket No. 93-252, *Second Report and Order*, 9 FCC Rcd 1411, 1459 (¶¶ 115, 119) (1994); 47 C.F.R. § 20.9(b).

Network receivers at 2290-2300 MHz,[300] and (3) Government and commercial telemetry above 2360 MHz.

124. In order to provide protection to these adjacent operations, we proposed that all emissions outside of the WCS bands of operation be attenuated below the maximum spectral power density (p) within the band of operation, as follows:

1) *For fixed operations, including radiolocation*: By a factor not less than 43 + 10 log (p) decibels ("dB") on all frequencies between 2300 and 2305 MHz and above 2360 MHz; and not less than 70 + 10 log (p) dB on all frequencies below 2300 MHz and between 2320-2345 MHz band.

2) *For mobile operations, including radiolocation*: By a factor not less than 43 + 10 log (p) dB on all frequencies between 2300 and 2305 MHz, between 2320 and 2345 MHz, and above 2360 MHz; and not less than 70 + 10 log (p) dB on all frequencies below 2300 MHz.

3) *For WCS satellite DARS operations*: The limits set forth in Section 25.202(f) of the Commission's Rules.[301]

For fixed and mobile operations, including radiolocation, we stated that the above requirements are based on peak power measurements (watts) using a resolution bandwidth of at least 1 MHz. In addition, to further protect operations in adjacent bands, we proposed to require that the frequency stability of transmission within the 2305-2320 and 2345-2360 MHz bands be sufficient to ensure that the fundamental emissions remain within the authorized frequency bands.

125. Finally, in order to protect Government Deep Space Network receivers at 2290-2300 MHz, we proposed to prohibit use of the 2305-2310 MHz band for airborne or space-to-Earth links. Further, we proposed that WCS operations within 50 kilometers (31 miles) of 35° 20' North Latitude and 116° 53' West Longitude (coordinates of the Deep Space Network receive site) be subject to coordination. Alternatively, we requested comment on whether it would be more appropriate to require less out-of-band attenuation in the case of mobile

[300] The National Aeronautics and Space Administration ("NASA") operates a complex at Goldstone, California (on the Ft. Irwin Military Reservation) for its Deep Space Network in order to provide continuous communications with planetary spacecraft. The Deep Space Network uses very large high gain antennas and state of the art receiver systems in order to receive very low-level signals in the 2290-2300 MHz band.

[301] *See* 47 C.F.R. § 25.202(f).

transmitters (*i.e.*, such transmitters would be subject to only the 43 + 10 log (p) dB requirement) but require that the coordination zone be extended to 120 kilometers (75 miles). We specifically requested that parties address the trade-offs with regard to lower mobile equipment costs and the additional coordination constraints imposed by this alternative.

126. *Comments.* A number of parties request that we substantially tighten the out-of-band emission limits proposed in the *NPRM*. Most notably, the four pending applicants for satellite DARS licenses -- AMRC, CD Radio, DSBC, and Primosphere -- state that the out-of-band emission limits proposed in the *NPRM* are insufficient to protect satellite DARS operations in the 2320-2345 MHz band from WCS operations.[302] The satellite DARS applicants urge us to adopt stricter out-of-band emission limits that they contend are needed to protect the sensitive satellite DARS receivers in the 2320-2345 MHz band from harmful interference.

127. Specifically, AMRC states that, assuming a 1 MHz measurement bandwidth, WCS mobile transmitter out-of-band emissions need to be attenuated by 115 dB and that WCS fixed transmitter out-of-band emissions need to be attenuated by 87 dB in order to protect satellite DARS receivers.[303] In addition, AMRC proposes that a 10 kHz measurement bandwidth, instead of 1 MHz bandwidth, be employed. Using its proposed 10 kHz measurement bandwidth, AMRC states that WCS mobile transmitter out-of-band emissions need to be attenuated by 135 dB and that WCS fixed transmitter out-of-band emissions need to be attenuated by 107 dB.

128. CD Radio acknowledges our efforts to balance the goals of protecting adjacent services and enabling low WCS equipment costs.[304] However, CD Radio argues that, if the proposed limits are adopted, hand-held WCS transmitters could "drown out" satellite DARS receivers whenever they are operated within a few feet of each other. CD Radio states that adequate protection can be achieved without imposing large additional expense on WCS equipment, particularly since the major practical interference problems will occur near the edges of the frequency bands. DSBC's initial calculations suggest that mobile PCS-like transmitters operating in the WCS bands would need to be separated by at least several miles

---

[302] *See* AMRC Comments at 1; DSBC Comments at 3-4; Primosphere Comments at 5-6; CD Radio Reply Comments at 3.

[303] These values are based on a satellite DARS receiver being 2 meters away from a mobile WCS transmitter and 50 meters away from a fixed WCS transmitter. In addition, AMRC assumes that the free space loss for a WCS mobile transmitter is 45.8 dB and for a WCS fixed transmitter is 73.7 dB. AMRC Comments, Technical Statement at 1-2.

[304] CD Radio Reply Comments at 3.

from mobile DARS receivers in order to avoid causing them harmful interference.[305] DSBC believes that the degree of interference that mobile, PCS-like operations can cause to satellite DARS receivers requires more than merely changing the out-of-band emission limits.[306] Specifically, DSBC argues that because satellite DARS receivers will be susceptible to absolute interference levels, and not to variable levels based on the power of an unrelated transmitter, the WCS out-of-band limits cannot depend on the power level of the WCS transmitter. DSBC has not developed any specific recommendations at this time due to the short comment period and suggests that the Commission's staff and the pending satellite DARS applicants work together to establish appropriate interference measures without delaying the WCS auction. Furthermore, DSBC argues that since 12.5 MHz of spectrum is the minimum amount of spectrum needed by each satellite DARS licensee for an economically viable satellite DARS system, alternative solutions, such as the use of guardbands and/or filters in the WCS segments that are adjacent to the 2320-2345 MHz band, should be considered.

129. Primosphere states that we should ensure that the WCS spectrum is allocated to a service or services that are compatible with satellite DARS in the 2320-2345 MHz band and that we should adopt WCS technical rules that will protect satellite DARS reception.[307] Specifically, Primosphere requests that, using the proposed 1 MHz resolution bandwidth, the out-of-band emission limits for WCS operations into the 2320-2345 MHz band be set at 92 + 10 log (p) dB per 1 MHz for fixed services and at 123 + 10 log (p) dB per 1 MHz for mobile operations.[308] In addition, Primosphere requests that out-of-band emissions not be permitted to exceed the above limits by more than 24 dB in any 4 kHz portion of the 2320-2345 MHz band. Primosphere argues that these tightened out-of-band emission standards are feasible and can be met through the use of affordable and available filters in the WCS transmitters and the establishment of guardbands, on the order of 100 to 150 kHz, on the WCS spectrum immediately adjacent to the edges of the 2320-2345 MHz band.[309] In addition, Primosphere requests that WCS transmissions be required to be circularly polarized in the opposite sense to

[305] DSBC Comments at 3.

[306] DSBC Reply Comments at 3.

[307] Primosphere Reply Comments at 1.

[308] Primosphere Comments, Technical Statement at 2.

[309] Primosphere assumed that mobile units will have a 100 kHz bandwidth and transmit at approximately one watt. Primosphere notes that satellite DARS signals would reach the Earth at a very low level and thus would not cause interference to adjacent band WCS services. In contrast, Primosphere states that since satellite DARS receivers are designed to receive these very low level signals and have inherent wideband characteristics, without the use of costly filters, they may experience interference from WCS transmitters operating in WCS bands.

satellite DARS transmissions, that WCS mobile units be limited to 0.5 watts, and that fixed transmitters be limited to 100 watts.[310]

130. In addition, AFTRCC -- the non-Government advisory committee for coordination of the flight test frequencies in the 2310-2390 MHz band -- states that the out-of-band emission limits proposed in the *NPRM* are insufficient to protect flight test operations in the 2320-2345 and 2360-2390 MHz bands from WCS operations.[311] AFTRCC is concerned that the rules do not provide for antenna gain or path loss and states that telemetry receivers require interference protection down to a level of -177 dBW/m^2/4 kHz. AFTRCC states that the issue of WCS out-of-band emission attenuation needs further study so that flight testing in the 2320-2345 and 2360-2390 MHz bands is protected. AFTRCC argues that Lucent's suggestion that the PCS out-of-band emission limit be applied provisionally for WCS operations (discussed *infra*) is inadequate. Specifically, AFTRCC notes that the PCS out-of-band emission limit is identical to that proposed for WCS mobile operations.[312]

131. Cornell states that the proposed WCS out-of-band emission limits would be insufficient to prevent harmful interference to planetary radar studies being conducted at the Arecibo Observatory in the 2370-2390 MHz band.[313] Specifically, the planetary radar system is used in a distinct transmit-receive mode of coded pulse train signals, and Cornell states that sideband emissions from satellite DARS operations in the 2345-2360 MHz band could interfere with the detection and decoding of the returning signal from the planetary object.

---

[310] Primosphere Reply Comments at 5-7. Primosphere also requests that satellite DARS licensees be given up to six months to notify the Commission of their choice of polarization. Primosphere Reply Comments, Attachment A at iii.

[311] AFTRCC Comments at 4-6.

[312] AFTRCC states that the aviation community agreed to reallocation of the 2310-2360 MHz band for satellite DARS at the time of the 1992 WARC in return for preservation of the flight testing allocation in the L-band (1435-1525 MHz) and the remainder of the S-band from 2360-2390 MHz. AFTRCC argues that integral to that agreement was the notion that flight testing could continue to use the 2310-2360 MHz band until satellite DARS was brought into use in such a manner as to be affected by mobile and radiolocation services. AFTRCC also argues that the adoption of revised footnote US238 is necessary to avoid needless disruption to the flight test ranges operating in the 2320-2345 MHz band. AFTRCC Reply Comments at 2-5.

[313] Cornell Reply Comments at 1. Cornell operates the Arecibo Radio Astronomy Observatory in Arecibo, Puerto Rico, under the terms of a cooperative agreement with the National Science Foundation. Cornell states that the planetary radar capabilities at the Arecibo Observatory are currently being upgraded at the cost of approximately $25 million. Cornell states that the planetary radar system operates at 2380 MHz using an instantaneous bandwidth of 20 MHz. Radar echoes of planetary surfaces contain unique information about the surface properties, the orbit, and the size of planetary objects. This radar technique has been successfully applied to all nearby planets as well as to comets and asteroids.

Cornell recommends that the emission limits set forth in Section 25.202(f) apply, except that, above 2370 MHz, the attenuation must be 54 + 10 log (p) dB. Alternatively, Cornell suggests that satellite DARS operations be limited to a maximum spectral power flux density of -197 $dBW/m^2/4$ kHz above 2370 MHz. For fixed and mobile WCS operations, Cornell recommends that out-of-band emissions be limited by a factor not less than 43 + 10 (p) in the 2360-2370 MHz band and by not less than 70 + 10 log (p) on all frequencies above 2370 MHz. In addition, Cornell requests that coordination of WCS equipment be required within Puerto Rico and surrounding islands and that such coordination be added to the requirements the Commission currently is considering for the Puerto Rico Coordination Zone in ET Docket 96-2.[314]

132. DigiVox states that the out-of-band emission limits proposed in the *NPRM* should be adopted.[315] DigiVox argues that increasing the limit above 70 + 10 log (p) dB as proposed by DSBC, or more particularly to 115 dB as proposed by AMRC, or even to 92 dB for the base and 123 dB for the mobile as proposed by Primosphere, would dramatically alter the equipment design and increase the manufacturing cost of equipment, in some cases rendering the provision of such competitive services cost-prohibitive.

133. Lucent requests that the proposed out-of-band emission limits be relaxed. Lucent believes that the out-of-band emission guidelines applied to the PCS band should be used initially in the WCS band, subject to revision once ANSI 2.3 GHz band-specific technical standards are developed.[316] This suggestion means that the power of any emission would be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB for both fixed and mobile.

134. A number of parties, such as AirTouch, Motorola and TIA, express concern over the potential for in-band interference between the various WCS services. AirTouch, for example, argues that the lack of standards in GWCS has delayed the development of equipment for use in that band. Motorola contends that, given the wide range of technical parameters under which the various services would operate, transmitters appropriate for a given application could nevertheless cause harmful interference to the receivers of another application.[317] TIA states that, as conceived, WCS will be plagued with interference problems

---

[314] *See Amendment of the Commission's Rules to Establish a Radio Astronomy Coordination Zone in Puerto Rico*, ET Docket No. 96-2, *Notice of Proposed Rule Making*, 11 FCC Rcd 1716 (1996).

[315] DigiVox Reply Comments at 5.

[316] Lucent Comments at 8. The out-band emission limit adopted for broadband PCS services is 43 + 10 log (p). *See* 47 C.F.R. § 24.238.

[317] Motorola Comments at 7.

caused by the operation of mutually incompatible services.[318] TIA states that it is widely acknowledged that mobile operations are incompatible with fixed and radiolocation systems; and, certainly, broadcast (and particularly broadcast satellite) operations are incompatible with all of the other primary services unless very carefully coordinated. TIA states that it is the Commission's responsibility, not the responsibility of third parties, to sort out the compatible from the incompatible uses so that the spectrum can be used effectively in the public interest.

135. AirTouch, Lucent and Vanguard also argue that WCS "in-band" emission limits are needed to protect WCS operations on different channels from interfering with one another. AirTouch urges the adoption of standards to facilitate the development of WCS equipment and minimize interference problems.[319] Lucent believes that minimal but necessary technical rules should be adopted to prevent interference, particularly if multiple types of technologies and systems are allowed to share the WCS bands.[320] Lucent states that the Commission should look to recognized industry standards organizations to recommend appropriate guidelines that would foster sound technical coexistence within the WCS bands. Vanguard argues that if the Commission is committed to a shared approach, then the Commission must take all technical steps necessary to minimize potential problems from co-use and must ensure that spectrum sharing is feasible.[321]

136. *Decision.* Based on the record before us, we find that the WCS out-of-band limits proposed in the *NPRM* would be insufficient to protect certain sensitive operations on adjacent frequencies. While it is our desire to provide WCS licensees with the maximum flexibility to provide a wide range of services, we also must ensure that WCS operations do not cause harmful interference or disruption to adjacent satellite DARS reception or the operations of the Arecibo Observatory. With regard to satellite DARS reception in the 2320-2345 MHz band, we concur with those commenting parties that suggest that additional attenuation of WCS out-of-band emissions is needed to protect such operations. We are therefore modifying our original proposal and will require that all emissions from WCS fixed transmitters be attenuated below the transmitter power (p) by at least 80 + 10 log (p) dB and that all emissions from WCS mobile transmitters be attenuated at least 110 + 10 log (p) dB within the 2320-2345 MHz band. In complying with these requirements, WCS equipment that uses circular polarization will be permitted to assume an allowance of 10 dB where such

[318] TIA Comments at 9.

[319] AirTouch Comments at 9, note 21.

[320] Lucent Comments at 8.

[321] Vanguard Comments at 2.

WCS equipment operates with opposite sense circular polarization from that used by DARS operators in the 2320-2345 MHz band.

137. In addition, we clarify that (p) is the output power of the transmitter, in watts. We further clarify that out-of-band emissions in any 1 MHz bandwidth must be attenuated by X + 10 log (p) dB below the output power of the transmitter, where X is the attenuation required for a one watt transmitter.[322] In addition, we believe that requiring the out-of-band emissions measurement to be made by setting the measurement instrument resolution bandwidth to 1 MHz would unfairly penalize WCS equipment due to the difficulty of eliminating energy outside of the 1 MHz resolution bandwidth. Therefore, for out-of-band emissions measurements we believe it is appropriate to permit use of a measurement instrument resolution bandwidth of less than the reference bandwidth of 1 MHz, provided that the energy is integrated over a 1 MHz bandwidth.

138. We believe that these changes will provide significantly improved interference protection to DARS from WCS operations. We are aware that these out-of-band emission limits may have significant cost or service implications for WCS, especially for operations on the channels immediately adjacent to the 2320-2345 MHz band. In particular, we understand that there is a substantial risk that the out-of-band emission limits we are adopting will, at least in the foreseeable future, make mobile operations in the WCS spectrum technologically infeasible. Nonetheless, we find that this level of attenuation is required in order to adequately protect satellite DARS reception from WCS transmissions. We believe that WCS transmitters can meet these limits through a variety of measures, including the use of linear amplifiers, filters distributed throughout the transmitter, and spectrum shaping signal processing. In this regard, we encourage potential WCS bidders and WCS equipment manufacturers to consult with one another prior to the commencement of the auction to determine what services and equipment can be economically provided on these frequencies. We believe that the limits we are adopting will allow both WCS and DARS to successfully operate. We also encourage and will allow WCS and DARS licensees to coordinate their operations to provide for greater or lesser protection on a mutually agreed basis. We expect WCS and DARS licensees to cooperate fully to minimize the possibility of harmful interference from one service to the other.

139. With regard to satellite DARS operations in WCS spectrum and the Arecibo Observatory, we find Cornell's comments persuasive. Accordingly, satellite DARS operations will be limited to a maximum power flux density of -197 dBW/m^2/4 kHz in the 2370-2390

[322] For example, if the measured transmitter output power or (p) is 100 W (20 dBW), then using the formula 70 + 10 log (p), the out-of-band emissions in any 1 MHz band must be attenuated by 90 dB below p, which corresponds to -70 dBW

MHz band at Arecibo, Puerto Rico.[323] The adoption of a power flux density limit has the advantages of being readily measurable and of not needing to be adjusted if spectrum outside the 2320-2345 MHz band is employed for satellite DARS operations.[324] Thus, we do not believe that Cornell's alternative out-of-band emission limit is necessary. Instead, since the location of the satellite will be known, it is a relatively simple matter for a satellite DARS licensee to meet this requirement.

140. With regard to fixed and mobile operations, we are adopting Cornell's proposed out-of-band emission limit of 70 + 10 log (p) dB for all frequencies above 2370 MHz. We also believe that this out-of-band emission limit will help to protect aeronautical telemetry and associated telecommand operations in the 2360-2390 MHz band and the launch vehicle frequencies at 2370.5 and 2382.5 MHz.

141. In order to protect the Deep Space receiver site located on Fort Irwin at Goldstone, California, we are prohibiting use of the 2305-2310 MHz band for airborne or space-to-Earth links. Additionally, in the 2305-2320 MHz band, we are requiring that all WCS equipment meet an out-of-band emission limit of 70 + 10 log (p) on all frequencies below 2300 MHz. Finally, all WCS operations within 50 kilometers of 35° 20' North Latitude and 116° 53' West Longitude must be coordinated with the National Telecommunications and Information Administration ("NTIA").[325]

142. In summary, the revised WCS out-of-band emission limits require that all emissions outside of WCS Blocks A, B, C and D ("the licensed bands of operation") be attenuated below the output power (p) of each transmitter, measured in watts, as follows:

1) *For fixed operations, including radiolocation:* By a factor not less than 80 + 10 log (p) dB on all frequencies between 2320 and 2345 MHz.

   For mobile operations, including radiolocation: By a factor not less than 110 + 10 log (p) dB on all frequencies between 2320 and 2345 MHz.

   For fixed and mobile operations, including radiolocation: By a factor not less

---

[323] The Arecibo Observatory is located at 18° 20' 46" North Latitude and 66° 45' 12'' West Longitude.

[324] We note that a typical DARS system in the 2320-2345 MHz band operating in compliance with Section 25.202(f) of the Commission's Rules will meet this power flux density limit at Arecibo, Puerto Rico.

[325] The coordination will be performed by the Frequency Assignment Subcommittee ("FAS") of the Interdepartment Radio Advisory Committee within NTIA. The FCC and NASA are two of twenty-one member departments and agencies represented on the FAS.

than 70 + 10 log (p) dB on all frequencies below 2300 MHz and on all frequencies above 2370 MHz; and not less than 43 + 10 log (p) dB on all frequencies between 2300 and 2320 MHz and on all frequencies between 2345 and 2370 MHz that are outside the licensed bands of operation. In addition, WCS operations within 50 kilometers of Goldstone, California must be coordinated with NTIA.

2) *For WCS satellite DARS operations*: The limits set forth in Section 25.202(f) of the Commission's Rules apply, except that satellite DARS operations are limited to a maximum power flux density of -197 dB(W/m^2/4 kHz) in the 2370-2390 MHz band at Arecibo, Puerto Rico.

143. In addition, we believe it desirable to permit WCS and satellite DARS licensees to voluntarily negotiate different limits if they so choose. For example, a WCS licensee could negotiate an agreement with a satellite DARS licensee that would permit the former greater out-of-band emissions in exchange for monetary compensation, or *vice-versa*. If WCS and satellite DARS licensees negotiate different limits, then we will require that the parties to the agreement maintain this information as part of their station files and disclose it to prospective assignees or transferees.

144. We also agree with the commenting parties that some in-band technical limits are needed between adjacent WCS channel block operations in order to facilitate spectrum sharing. Accordingly, we are adopting an in-band emission limit that will require WCS licensees to attenuate their signals by at least 43 + 10 log (p) at the edge of their block, except between commonly held channel blocks (which require no attenuation). We note that an attenuation of 43 dB is commonly employed in other services and that it has been found there to adequately prevent adjacent channel interference.[326] Furthermore, we believe that the adoption of a minimum adjacent block attenuation value of 43 dB -- coupled with the median field strength of 47 dBuV/m at any location on the border of a WCS service area -- is the least intrusive regulation possible that will minimize harmful interference.

8. International Coordination

145. *Background.* In the *NPRM* we stated that until international agreements are completed WCS operations will be required to protect existing non-U.S. operations in the 2305-2320 and 2345-2360 MHz bands and WCS operations in the border areas would be subject to coordination with those countries, as appropriate. In addition, we noted that satellite DARS operations on WCS spectrum would be subject to international satellite

[326] *See* 47 C.F.R. §§ 22.359(iii), 22.917(e), and 24.238.

coordination procedures. We stated that parties should be aware that international coordination could be a complex and lengthy process and could vary significantly depending upon the types of WCS services that are to be provided. We stressed therefore that international coordination requirements should be taken into account in developing business plans for the provision of WCS and that international coordination would be particularly important for parties contemplating the provision of WCS in border areas or the provision of satellite DARS operations.

146. *Comments.* TIA, SIA, ADC, NAB, and DSBC are the only commenters to directly discuss international coordination issues. Specifically, TIA notes that the 2290-2360 and 2520-2590 MHz bands recently have been made available in Canada for low capacity point-to-point and point-to-multipoint microwave systems.[327]

147. SIA states that competing for satellite DARS authorizations in the WCS auction will be difficult because the bidders will not know at the time they are bidding the extent to which the Commission will be able to successfully coordinate the use of this spectrum with foreign administrations that may be affected.[328] ADC states that we can assure spectrum for DARS, while avoiding the concerns regarding potential interference to Canadian terrestrial facilities, by allocating the entire 2345-2360 MHz band for DARS, but precluding DARS from the 2305-2320 MHz band.[329] DSBC states that for satellite DARS licensees supplementing their 2320-2345 MHz systems with WCS spectrum (for terrestrial repeaters, for example), coordination with Canadian systems in WCS spectrum likely would be less costly and time consuming for 5 MHz and MTA licenses than for larger bandwidth blocks and service areas.[330]

148. In contrast, NAB requests that satellite DARS licensees be prohibited from operating terrestrial repeater networks in the 2310-2330 MHz band for the purpose of mitigating harmful interference to Canadian services.[331] NAB claims that terrestrial repeaters used along the Canadian border would significantly differ from "gap fillers" used in urban canyons. Specifically, NAB argues that programming for gap fillers would be fed by satellites, whereas repeaters used along the Canadian border would be terrestrially fed. NAB

---

[327] TIA Comments at 11. These Canadian microwave systems operate in one to ten megahertz of bandwidth. *See* New Standard Radio System Plan 302.29 of Industry Canada.

[328] SIA Comments at 3.

[329] ADC Comments at 4.

[330] DSBC Comments at 9.

[331] NAB Comments at 4.

argues that such use is not part of a broadcast satellite system, but rather is a broadcast terrestrial radio service. NAB objects to DSBC's suggested use of terrestrial repeaters in order to facilitate frequency coordination of satellite DARS service along the Canadian border, arguing that such use would not fall within the domestic and international allocations for the WCS bands.[332] In addition, NAB states that the fact that terrestrial "repeaters" would be operating at a different frequency than their associated satellite DARS broadcasts suggests that these in fact would be translators, not repeaters. NAB states that this distinction is important because the rules that govern the use of each frequency may differ, as in the case, for example, of the FM broadcast service.[333] DigiVox agrees with NAB that the use of WCS spectrum by satellite DARS licensees for a complementary broadcast terrestrial service is not an application for which the spectrum is proposed to be allocated and, therefore, such use should be prohibited in the 2310-2320 MHz band.[334]

149. In its reply comments, Primosphere states that the service allocation as well as technical standards should consider trans-border coordination.[335] Primosphere notes that satellite DARS systems using the 2320-2345 MHz band will face coordination with Canadian terrestrial and aeronautical telemetry systems regardless of what services are provided in the 2305-2320 and 2345-2360 MHz bands and that the WCS systems also must coordinate with Canada and Mexico. Primosphere states that Canada not only has terrestrial and aeronautical telemetry systems in the WCS bands, but also has recently made the WCS bands available for low-capacity point-to-point and point-to-multipoint microwave systems operating in 1 to 10 MHz of bandwidth. Primosphere concludes that the mobile and radiolocation services, as components of WCS, likely would be very difficult to coordinate with the Canadian systems. Primosphere argues that because of the impact coordination may have on system design and operating parameters, the Commission must ensure that satellite DARS licensees are permitted to coordinate as soon as they are licensed and, in any event, prior to or contemporaneously with systems that may be licensed in the WCS bands. Primosphere argues that satellite DARS licensees must not be disadvantaged *vis a vis* U.S. terrestrial systems in any cross-border coordinations.

150. *Decision.* We reiterate that international coordination will be required for WCS operations near the United States' borders and, depending on the service and its interference

---

[332] NAB Reply Comments at 1-2.

[333] *See* 47 C.F.R. § 74.1231. In particular, NAB notes that the rules for insertion of locally originated signals (local to the translator/repeater site) for FM broadcast translators and boosters (*i.e.*, repeaters) are different.

[334] DigiVox Reply Comments at 7.

[335] Primosphere Reply Comments at 7.